Gir is a heavy dairy breed originated in Saurastra region of Gujarat state. Adult cows of this breed weigh about 500 kg and adult bulls weigh about 600 kg, respectively. Male animals are generally neglected right from birth and are underfed during growth stage resulting in inferior breeding bulls under field conditions. Male calves are usually maintained on butter milk during initial stages of life in place of whole milk, which also is a factor causing poor growth rate in male calves. Unless the male calves are taken care of right from birth, good quality breeding bulls will not be available from high producing cows. Genetic superiority does not only necessarily mean sexual libido in bulls. Bulls with high conception rate may not mount females and this problem is just not limited to bulls under field conditions, but also to breeding bulls maintained at semen collection centers.

Natural mating is preferred by farmers in Saurastra region, especially for heifers at village level due to heavy weight of Gir bulls. However, in multipara cows farmers realize the importance of artificial insemination and have adopted this technique in improving Gir breed. With the realization of the need to conserve indigenous dairy breeds such as Gir and Kankrej, farmers are aware of their cattle wealth and expect high quality semen available for insemination resulting in high conception rate in the region. Frozen semen doses are available for breeding in veterinary clinics all over region, with varying reports regarding conception rate in Gir cows, from as low as 30% to as high as 55% under field conditions (Anonymous, 2015).

Nutrition plays critical role right from birth in enhancing the vigour and quality of semen. Though major nutrients are adequately fed to bulls as per nutritional requirements on scientific lines, yet bulls may also not respond to semen collection or produce quality semen for further processing due to deficiency of micro nutrients in the ration. Various trace minerals play an important role in enhancing semen quality and thereby conception rate. Feeds and fodders are the main sources of macro and micro nutrients for livestock. Cattle owners graze their cattle in Gauchar land and concentrate feed is offered only to
milch animals. Supplementation of concentrate or mineral mixture is not followed by farmers. Crop residues, which form the bulk of rations in India, are deficient in most of the mineral elements including Zn (Datt and Chhabra, 2005).

However, forty eight percent of Indian soils are deficient in Zn (Arunachalam et al., 2013) which may affect the male reproduction. Intense agriculture for food and commercial crop reported in micro nutrient deficiency and resulted in disturbed soil-plant-animal relationship. To strengthen the relationship, supplementation of trace minerals to the rations is required to combat deficiencies. This is more true, when crop residues are main components of bulls ration and are deficient in major trace minerals. Zn along with Cu plays important role in growth of ruminants (Mondal et al., 2013). Physiologically, Zn is vital for growth and development, sexual maturation and reproduction, dark vision adaptation, olfactory and gustatory activity, insulin storage and release and for a variety of host immune defenses.

Among different trace minerals, Zn plays an important role in both male and female reproduction. Normal requirement of Zn in most domestic animals ranges between 40-100 ppm. Zn content in animal feeds varies widely due to various factors viz., soil type, seeds, fertilizers, irrigation and climatic conditions. Oil seed cakes, cereal brans and legume seeds contain higher concentration of Zn, followed by green fodders, cereal grains and cereal straws. Zn is found to be important mineral in improving the quality of semen. Organic and inorganic forms of Zn are metabolized differently in the body after absorption and organic form of Zn is better absorbed and utilized in body compared to inorganic Zn (Galyean et al., 1999). Feeding legume fodders and zinc rich concentrate alleviate Zn deficiency in ruminant.

Zn is the only metal present in all the six classes of enzymes established by International Union of Biochemistry. Zn affects the production and secretion of hormones such as testosterone, insulin and adrenal corticosteroids. Spermatogenesis and the development of the primary and secondary sex organs in the male are impacted by dietary Zn levels. It has catalytic, structural or regulatory roles in more than 200 Zn-metalloenzymes identified in the biological systems. It plays an important role in polymeric organization of macromolecules like DNA and RNA, protein synthesis, cell division and stability of biological membranes (Chvapil, 1973). Zn is required for the structural and
functional integrity of over 2,000 transcription factors and almost every signaling and metabolic pathway is dependent on one or more Zn requiring proteins (Beattie and Kwun, 2004; Cousins et al., 2006).

Zn plays structural role in the formation of Zn fingers, which are exploited by transcription factors for interacting with DNA and regulating the activity of genes. Another structural role of Zn is in the maintenance of integrity of biological membranes resulting in their protection against oxidative injury.

Improvement in the sperm production and fertility is achieved following the supplementary feeding of micronutrients such as Copper, Cobalt, Zinc and Manganese. Proximal part of the small intestine is the active site for Zn absorption in monogastrics and rumen in ruminants (Arora et al., 1969) by an active carrier mediated process. Mucosal induction of metal-binding protein known as metallothionine, limits Zn absorption. Zn in the serum bound is predominately to albumin (60%), α-macro-globulin (30%), and transferin (10%). There is no specialized Zn storage system in the body and there must be daily intake of Zn to achieve a steady state (Scott and Bradwell, 1983).

Zn as an important trace mineral playing critical role in metabolic activities, has received attention of scientific community in improving libido, semen quality and conception rate in breeding bulls. Of interest to the present study is organic Zn supplementation in the rations of Gir breeding bulls vis-à-vis its effect on sexual behaviour and semen quality.

The present investigation was formulated with the following objectives.

Objectives:

1. To assess the effect on feed and water intake in Gir bulls in view of organic Zn supplementation in the diet.
2. To evaluate pre and post thaw semen characters in Gir bulls supplemented with organic Zn.
3. To record sexual behavioural changes, if any, in Gir bulls maintained on organic Zn supplemented rations.